Pathological Correlation of Solid Liver Lesion with Gray Scale Sonographic Findings

Jha AK*, Koirala KB**, Thakur A***

*Consultant, Radiology, **Senior Consultant Radiologist, *** Radiology, MBBS, MD, Resident at NAMS, Bir Hospital.

ABSTRACT

Wide availability, high sensitivity and low cost make ultrasound the preferred modality in imaging of abdomen and in particular the liver. Radiologists need to identify lesions as well as to characterise the malignant ones that need biopsy since it is not possible to biopsy all liver lesions. The objective of study was to analyse the sonographic findings of a focal solid liver lesion with an attempt to differentiate malignant from benign hepatic lesions.

The study was a prospective, hospital-based observational study carried out in the radiology department of Bir Hospital from April 2013 to April 2014. Total of 50 patients from age ≥15 years referred for USG of abdomen with suspicious solid lesion in liver were included in the study. All cases with a solid liver lesion were evaluated for site, size, number, echogenicity, margin, hypoechoic halo and calcification on B-mode USG & categorised into benign & malignant types. They underwent FNAC based pathological diagnosis. Correlations were obtained between sonographic and pathologic findings. Data analysis was done using SPSS 21.0 and MS-Excel Software. Chi Square test was used for statistical analysis.

In our study of 50 patients, grey scale prediction of malignancy had a sensitivity of 97%, specificity of 66%, PPV of 93%, NPV of 85% and Accuracy of 92%. Thus we concluded that ultrasonography is a useful modality to detect and differentiate benign from malignant solid liver lesion. It can minimize the unnecessary biopsy in benign lesion.

Key words: fine needle aspiration cytology; Focal Nodular Hyperplasia, Negative Predictive Value, Positive Predictive Value; Ultrasonography.

INTRODUCTION

Liver is the largest solid organ in the abdomen with numerous pathologies that need to be imaged. Space occupying lesions of the liver can be developmental, neoplastic, inflammatory and miscellaneous. Neoplastic liver lesion is classified into benign and malignant lesion. Benign liver lesions are found in more than 20% of general population that includes haemangioma, FNH and hepatic adenomas.

Malignant liver lesion can be classified into primary and secondary. The majority of primary malignant liver lesion originating from hepatocytes include hepatocellular carcinoma, fibrolamellar hepatocellular carcinoma and hepatoblastoma whereas those from bile duct include cholangiocarcinoma and cystadenocarcinoma. Mesenchymaltumour such as angiosarcoma, epitheloidhemangioendothelioma and lymphoma are rare.

Hepatocellular carcinoma (HCC) is the most common primary malignant neoplasm of the liver worldwide. It is the fifth most common cancer in men and seventh in women. Most of the burden of HCC, about 85%, is borne in developing countries. In a study conducted at Bir Hospital, Kathmandu, Nepal, malignancy of liver accounts for the fifth most common disease in the liver and alcoholic liver disease being the most common.

The liver is second only to regional lymph node for metastatic disease. Metastatic liver disease is 18-20 times more common than HCC. Liver is the second most common site for metastasis from gastrointestinal tract, pancreas, breast and lung.
One of the most challenging tasks for a radiologist in the evaluation of solid liver lesion is an attempt to classify a lesion into benign and malignant. Malignant lesion needs to be identified early in order to allow for an aggressive management, in contrast to benign lesion which may be subjected to a more conservative management. Wide availability, high sensitivity and low cost make ultrasound the preferred first line modality in imaging of the liver. USG has become increasingly important in the screening and management of liver mass due to its ability to identify lesions, distinguish between cystic and solid nature and to demonstrate relationship to the vital vascular structures.

Since lesions of the liver are fairly common, performing FNAC or biopsy for all would not be possible or cost effective. Preliminary USG B-mode characterization of lesions is necessary to select them for further work up. This study was intended to compare the diagnostic accuracy of USG alone and its correlation with pathological report (FNA cytology, biopsy or surgical resection) in differentiating benign and a malignant solid liver lesion.

**METHODS**

The study was a prospective, hospital-based observational study carried out in department of Radiology, Bir Hospital from April 2013 to April 2014 after the approval & ethical clearance by Institutional Review Board. Total of 50 patients referred to radiology department from age 15 years and above for sonography of abdomen with suspicious solid liver lesion were enrolled. Informed written consent was taken from all of them. Detailed clinical information was recorded in data collection sheet. All patients with solid or predominantly solid liver lesions were included in the study. Criteria for exclusion were: (1) Cystic liver lesions like hepatic cyst, liver abscess (2) bleeding diathesis (3) hepatic haemangioma (4) Uncooperative patients (5) Patient under 15 years of age. USG was done in B-mode in Toshiba (Aplio 400) machine using 3.5 MHz curvilinear probe for deeper lesions and 9.0 MHz linear probe for superficial ones. Lesions were evaluated for site, size, number, echogenicity, margin, hypo-echoic halo and calcification & then categorised into benign and malignant types. USG findings were recorded in data sheet. All cases underwent FNAC based pathological diagnosis. USG reports were compared with pathological reports and validity of B-mode USG in predicting the nature of solid liver lesion was assessed. Collected data was analysed using SPSS 21.0 program and Microsoft Excel Software. Chi Square test was used for statistical analysis.

**RESULTS**

Out of the 50 patients, 32 (64.00%) were male and 18 (36.00%) were female. Hence highest incidence of liver malignancy was noted in male patient with gender ratio (male: female) of 1.7:1. Minimum age was 25 years and maximum age was 84 years of which most patients were between 55 and 64 years.

Overall, metastasis was the most common histological cell type (60%) followed by primary malignancy (22%). Malignancy was associated with alcoholism in 58% of cases. 24% of non–alcoholic cases had liver malignancy. Most common cell type among alcoholics was hepatocellular carcinoma. Among 50 patients, 30 (60%) had metastasis, 11 (22%) had primary malignancy and 9 (18%) had benign lesion. Out of 41 malignant lesions, 30 (73.17%) were metastasis and 11 (26.82%) were primary malignancy of liver.

Among 41 malignant lesions 5 (12%) were isoechoic, 17 (41%) hypoechoic, 9 (22%) hyperechoic and 10 (24%) of mixed echogenicity. Among benign lesions 2 (22%) were isoechoic, 7 (78%) were hypoechoic and none of the lesions were hyperechoic or of mixed echogenicity. Statistical analysis using chi square test showed that the interpretation was not significant (p-value =0.154).The result obtained was insignificant because most of the lesion was metastasis in the liver, as the patients in developing country present late, and the echogenicity could not be well correlated. Table 1 provides the sonographic pathological correlation.

<table>
<thead>
<tr>
<th>Pathological Diagnosis</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Benign</td>
<td>Malignant</td>
</tr>
<tr>
<td>Sonographic Findings</td>
<td>Number</td>
</tr>
<tr>
<td>Echogenecity</td>
<td></td>
</tr>
<tr>
<td>Isoechoic</td>
<td>2</td>
</tr>
<tr>
<td>Hypoechoic</td>
<td>7</td>
</tr>
<tr>
<td>Hyperechoic</td>
<td>0</td>
</tr>
<tr>
<td>Mixed</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>9</td>
</tr>
</tbody>
</table>

Among 41 malignant lesions, 30 (73%) lesions were with regular and 11(27%) were with irregular margin. Out of 9 benign lesions all 9 (100%) were with regular margin. On statistical analysis margin of the lesion was...
statistically insignificant on sonographic analysis for benign and malignant lesion (p-value >0.001).

Among 41 malignant lesions, 31(76%) lesions had hypoechoic halo around the lesion and in 10 (24%), there was no hypoechoic halo. Out of 9 benign lesions, 7 (89%) did not have hypoechoic halo and 1 (11%) had a hypoechoic halo around the lesion. The sensitivity of hypoechoic halo to predict malignancy was 72%, specificity 85%, PPV 96%, NPV 33% and accuracy of 94%. Statistical analysis by Chi square test showed the findings to be statistically significant (p –value< 0.001). Table- 2 & Table- 3 provide the hypoechoic halo correlation with pathological and radiological diagnosis respectively.

Most of the malignant lesions (82.5%) were located in the right lobe of liver. Among grey scale features, hypoechoic lesion and hypoechoic halo surrounding the lesion were statistically significant for malignancy. Most of metastatic lesions had a hypoechoic halo.

Out of 43 cases diagnosed as malignant by sonography on grey scale, 40 were proved to be malignant on histology and 3 of them were benign. Necrotic area was most commonly seen in hepatocellular carcinoma. Out of 7 cases interpreted as benign, 6 were proved to be benign and 1 malignant. Thus grey scale prediction of malignancy had a sensitivity of 97%, specificity of 66%, PPV of 93%, NPV of 85% and Accuracy of 92%. Table-4 provides the correlation of grey scale sonologic and pathological diagnosis.10

**DISCUSSION**

Among 50 cases in our present study 30 (60%) lesions were metastasis, 11 (22%) primary hepatic malignancy and only 9 (11%) were benign cases.

Echogenicity or margin of the lesions was not significant as predictors for malignancy. Among miscellaneous specific sonographic findings of a lesion like hypoechoic halo, central scar, calcification and intra-lesional necrosis, the hypoechoic halo was highly significant feature in our study to differentiate benign from malignant lesion. However this finding could not differentiate primary from secondary malignant lesion. Necrotic area was most commonly seen in hepatocellular carcinoma.

Among 41 malignant cases found in our study 31(75%) had hypoechoic halo around the lesion and in 10 (25%) there was no hypoechoic halo. Out of 9 benign lesions hypoechoic halo was found in only 1 (11%) patient and 8 (89%) were without hypoechoic halo. Wernecke K, Vassallo P et al 6 in their study found that the halo could be detected in 44 malignant tumours (88%) and only in seven benign tumors (14%).

In our study of 50 patients, grey scale prediction of malignancy had a sensitivity of 97%, specificity of 66%, PPV of 93%, NPV of 85% and Accuracy of 92%. This makes B-mode USG grey scale imaging an important tool for evaluation of solid liver lesions. The limitation of our study was that the sample size was relatively small. This study also did not combine Doppler study or bubble contrast for further characterisation of lesions. However it is to be noted that high end USG machines are not available in most of our district level hospitals. When available, radiologists or sonologists are not technically competent to use it. Bubble contrast has not been used in Nepal to date.11

**ACKNOWLEDGEMENT**

We would like to thank the entire family of Department of Radiology, NAMS, Bir Hospital, for providing the necessary platform for conducting the study & their invaluable suggestions & guidance. Also we express our gratitude for members of Department of Pathology, Bir Hospital, for their suggestions & sustained cooperation.12

**REFERENCES**


